

# The Virtual Hospital: The Future of Information Distribution in Medicine

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Primary care physicians are often required to work in isolation without adequate information resources. If these physicians are to provide quality medical care and survive the rigors of their profession, they will require a powerful and convenient source of current information. Optimal diagnosis and therapy are predicated on timely access to information. This information has been available within academic centers; however, a cost-effective link to primary care physicians has not been possible until now. Emerging wide-area computer networks and inexpensive multimedia computers will allow the efficient transmission of this information, thereby forging a partnership between academic centers and the primary physician.

This combination of networks and computers will be the building blocks of the "Virtual Hospital." A Virtual Hospital is a continuously updated medical multimedia database stored on computers and accessed through high-speed computer networks. This information will be available to primary care physicians 24 hours a day. Virtual Hospitals will be created by medical centers and will provide invaluable support to primary practitioners as well as laying the groundwork for our future involvement in "distance learning".

In 1992, our laboratory (Electric Differential Multimedia Laboratory) developed a hardware independent approach to multimedia learning that creates totally digital medical media that is stored in industry standard file formats. [1] [2] Our Virtual Hospital's medical media is stored in a multimedia database on a computer file server (storage computer) that is linked to a high-speed computer network. This medical media is organized into medical multimedia textbooks (MMTBs). An MMTB is a multimedia computer program that patterns its user interface after a printed textbook but incorporates functions beyond those of a printed textbook such as the ability to play video and audio clips. MMTBs can display an almost unlimited number of high-resolution images and can be quickly and rapidly searched and updated. The multimedia files comprising each MMTB are stored in the Multipurpose Internet Mail Extension (MIME) multimedia file format, an Internet standard for storing multimedia information. (Lacey DL, D'Alessandro MP, Galvin JR. NetMMTB: The future of medical publishing via Internet accessible

multimedia textbooks - in preparation). The multimedia database is organized using the Gopher software technology. Gopher facilitates the acquisition of information stored on the Internet. Gopher servers are file servers that organize information into a coherent knowledge structure or "Gopherspace." Gopher clients are graphic user interfaces that run on personal computers and allow intuitive access to Gopherspace.

The Virtual Hospital's MMTBs are shipped across high-speed computer networks to physicians in their offices or homes where they can be viewed using standard personal computers (Macintosh, Windows, and NeXT) equipped with public domain Gopher clients. The United States government has funded the creation of high-speed data superhighways in the form of the National Research and Education Network (NREN). This computer network will be available throughout the country and is based on high-speed fiber optic technology; it serves as our transmission medium.

## Reference

- [1]. M.P. D'Alessandro, J.R. Galvin, W.E. Erkonen, M.A. Albanese, V.E. Michaelson, J.S. Huntley, R.M. McBurney, G.Easley. The instructional effectiveness of a radiology multimedia textbook (HyperLung) versus a standard lecture. *Investigative Radiology*. (In press), 1993.
- [2]. M.P. D'Alessandro, J.R. Galvin, W.E. Erkonen, D.M. Santer, J.S. Huntley, R.M. McBurney, G.Easley. An approach for the creation of multimedia textbooks for radiology instruction. *AJR*. (In press), 1993.